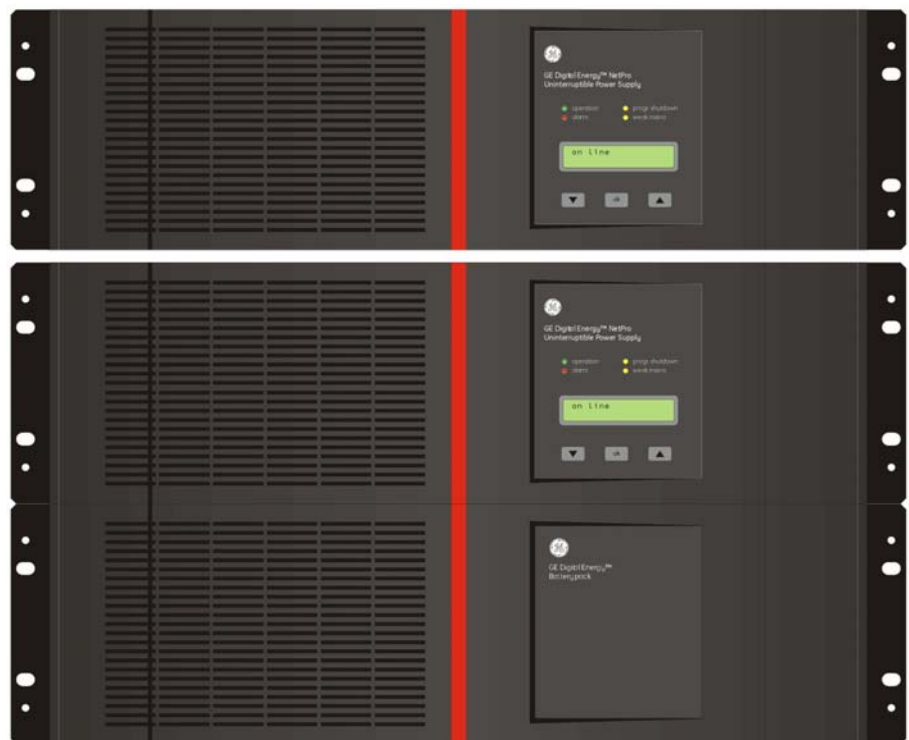


Product description

Digital Energy™ Uninterruptible Power Supply

On-line rackmountable

NetPro 19" UPS / 2000 - 3000 VA



GE imagination at work



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1 - Introduction

The **GE (General Electric) Digital Energy™ NetPro 19" UPS** series is a compact, truly on-line system (VFI, Voltage and Frequency Independent) which incorporates the most advanced power electronics technology to provide exceptional protection for electrical equipment.

Each GE Digital Energy UPS is thoroughly tested and conforms within tolerance to the following specifications. (Data are mean values and are subject to change without notice.) Information applies to all models unless otherwise specified.

2 - Functional explanation

2.1 Principles of operation

The UPS stores electric energy in batteries housed in the unit. This allows the UPS to supply output power even when the incoming mains power is cut off completely. Energy is stored as Direct Current (DC), while input and output energy are Alternating Current (AC) in sine wave form. Therefore the UPS contains an input converter (AC to DC) and an output converter (DC to AC) (See fig.1).

The NetPro 19" UPS is a SECOND GENERATION On-Line UPS with:

- a capacitor bank in the DC line
- battery not in line with the DC link, resulting in:
 - enhanced battery life
 - optimal battery charging
- full wave input converter with power factor correction
- extremely wide input voltage and input frequency tolerance
- no inrush current at start up

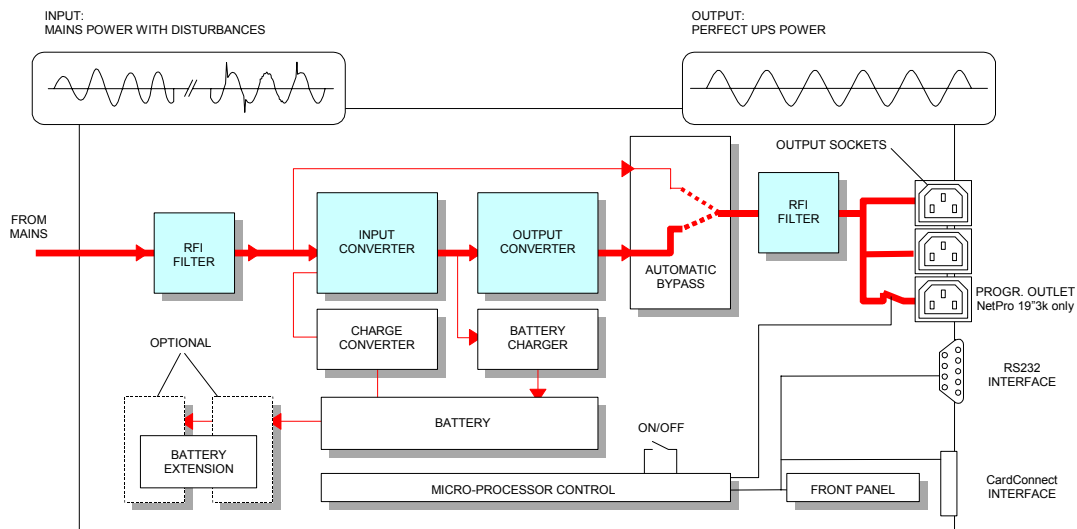


Figure 1 Block diagram of the NetPro 19" 2000-3000 UPS, mains present

2.2 Normal conditions

Under normal input conditions (see section 4.2) energy from the mains is channeled through the input converter, which supplies the output converter and, together with the battery charger, keeps the battery fully charged. Surges and spikes are blocked completely at the input converter and very instable mains can be supported. The output converter synthesizes a completely new AC output sine wave to supply the load (electrical equipment).

2.3 Mains failure

In the event of a mains power failure (i.e. mains absent or outside tolerance) the output converter uses the energy reserve stored in the battery to continue to produce AC power, ensuring unbroken output (fig. 2). No interruption or alteration will ever be noticed in the output power.

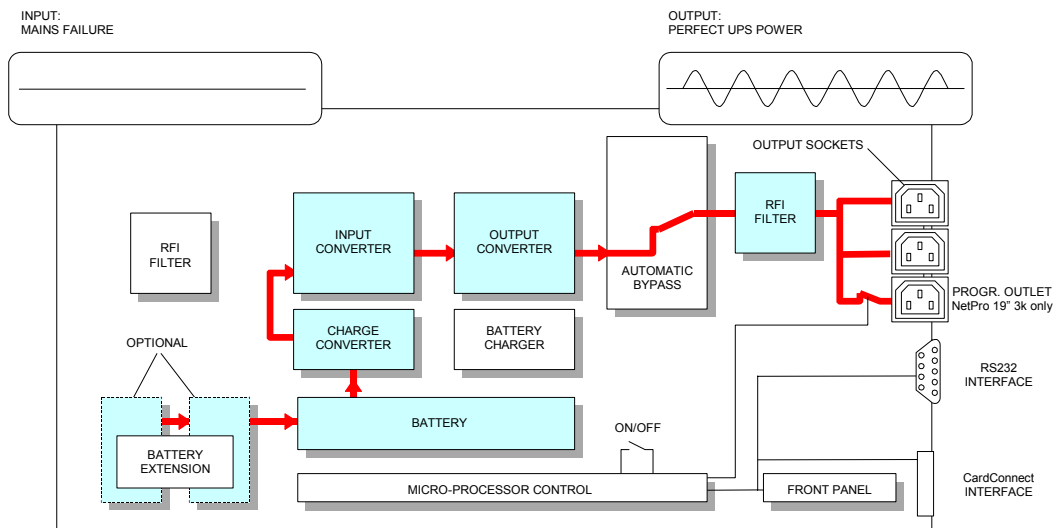


Figure 2 Block diagram of the NetPro 19" 2000-3000, mains failure

In the event of an extended mains failure, the output converter will stop when the battery energy has been used up. At this point, the UPS is no longer able to power the connected equipment.

When the mains is re-established within tolerance, the input converter will be supplied again by the mains and the batteries will be recharged, making them ready to support future power failures.

2.4 Bypass operation

If the output converter is unable to deliver the demanded output power (overload, overtemperature) the bypass switch will automatically transfer the load to the mains. If bypass operation is caused by an overload situation, the UPS will try to switch back to output converter after 0.1 seconds, without generating any alarm. This way bypass alarms due to inrush currents, which normally last less than 0.1 seconds, are avoided. If the overload situation still exists after three switch-back attempts (i.e. the overload is not caused by inrush currents), the unit will remain in bypass mode, generating a bypass alarm. It will switch back to output converter when the overload has been removed. If bypass operation is caused by overtemperature, the unit will switch back when the temperature has dropped below alarm level.

When the normal situation is restored, the load will be transferred back to the output converter.

The transfer time is less than 4 msec and is sufficiently short for modern computers, which can ride through 10-20 milliseconds.

If a power failure occurs during bypass operation, the UPS will switch back to inverter and eventually, when the batteries are depleted, output power is lost. If the UPS functions under overload conditions it may not be able to protect the load.

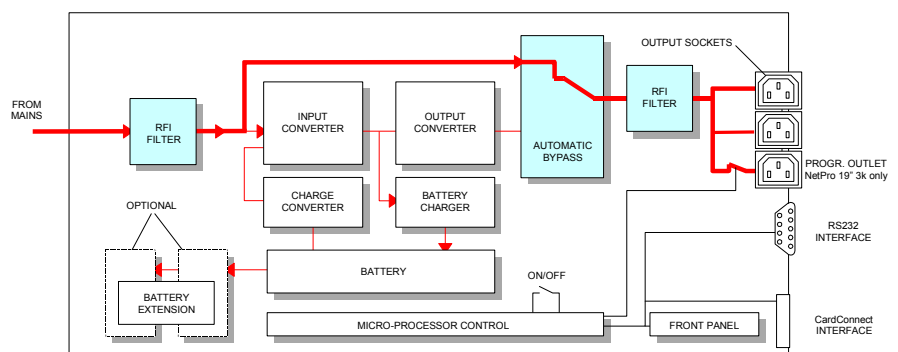


Figure 3 Bypass operation

3 - External description

3.1 Front and rear panel

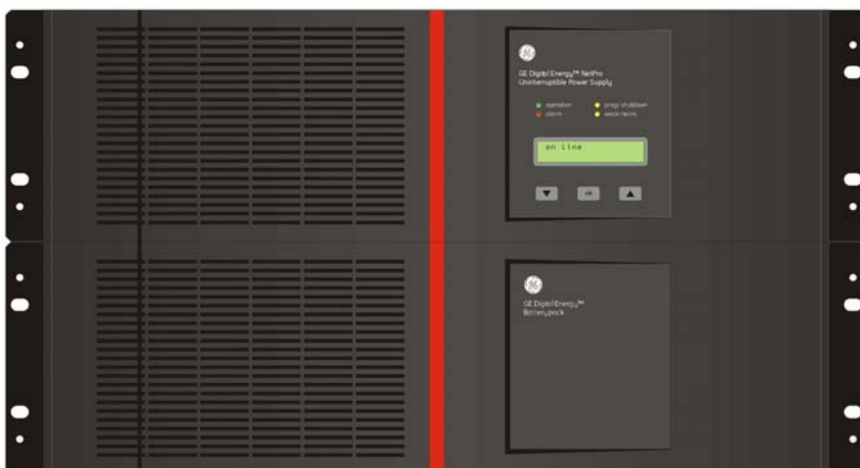


Figure 4 Front and rear panel NetPro 19" 3000 (2000 VA model is without lower battery compartment)

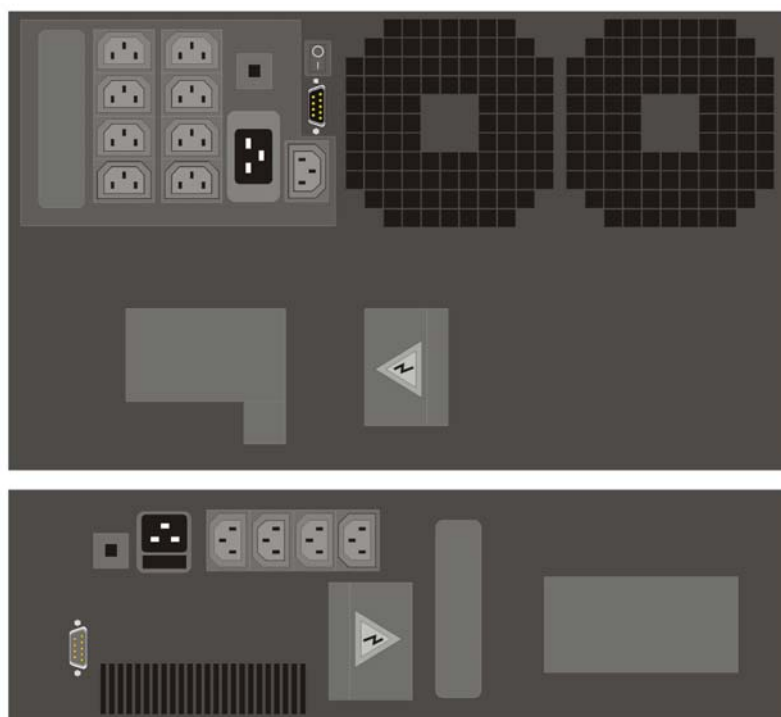


Figure 5 Rear panels NetPro 19" 2000 (top) and NetPro 19" 3000 (bottom)

FRONT

Operation	: green LED
Alarm	: red LED
Progr.shutdown	: yellow LED
Weak mains	: yellow LED
LCD screen	: 2 x 16 characters
Push-buttons	

REAR

On/Off switch	
ComConnect	: 9-pin Sub-D male
Output sockets (4/8)	: IEC 320 C13 female
Progr. outlet (1)	: IEC 320 C13 female (3kVA model)
Mains inlet	: IEC 320 C14 male
TCB / input fuse	: ratings see 4.1
Fans	: electronically controlled
CardConnect Slot	
DC connector	

The LCD screen shows UPS system data, status messages, alarm messages, settings.
The language is selectable: English, German, French, Spanish, Italian

Three types of screens are displayed: default screens, service screens, alarm screens (see section 5.5)
Example of a default screen:

230V	12	23min
1520VA		912W

- 230V = the true RMS input voltage
- 12 = time until sleep in minutes, if activated
- 23min = the calculated available runtime, at present load
- 1520VA = actual output power of the UPS in VA
- 912W = actual output power of the UPS in W

The 'service screens' show the UPS function choices and their actual value.
Example of a service screen:

Battery	capacity
80%	14.2Ah

- 80% = the available battery capacity, as % of:
- 14.2Ah = the battery capacity, either the set capacity or the result of a deep battery test (UPS monitoring software required).

The remaining service screens show a programmable UPS function and its actual setting.
The table below gives an overview of all programmable functions, ranges and settings
(all these settings can be locked):

Screen text	Range	Default
Prog. outlet (3kVA only) If set 'AUTO': Off auton. time	ON/OFF/AUTO 0 - 60 min.	ON 0
Fr.tracking rate	2 Hz/sec or 10 Hz/sec	10 Hz/sec
Start auton. time	0 - 60 min.	0 min.
Buzzer delay	0 - 60 sec.	8 sec.
Language	English, German, French, Spanish, Italian	English
No-load shutdown	ON/OFF	OFF
Battery capacity* (display shows no text, just a figure 4 - 250)	4 - 250 Ah	7Ah
Bypass enable	YES/NO	YES
Output voltage*	220 / 230 / 240 V	230 V
Output frequency*	50 / 60 Hz	50 Hz
Restore defaults*		

UPS functions, ranges and default settings

* Restore defaults: restores the default settings except the settings marked with *

NetPro 19" model : **2000** **3000**

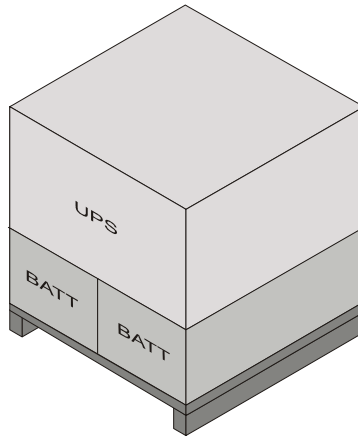
3.2 Enclosure

Construction : steel/plastic
 Colour : RAL 9005 (black)
 Protection : IP 20
 Packaging : recycleable, rugged

3.3 Dimensions

NetPro 19" 2000 (hwxwd, mm) : 133.5 (3HU) x 450 (19") x 440
 Shipping dimensions (hwxwd, mm) : 255 x 550 x 550
 NetPro 19" 3000 (hwxwd, mm) : 267 (6HU) x 450 (19") x 440
 Shipping dimensions (hwxwd, mm) : 635 x 560 x 560*
 Depth required in 19" rack (mm) : 420 (without connectors)
 Battery module (hwxwd, mm) : 133.5 (3HU) x 450 (19") x 440

* The NetPro 19" 3000 is shipped with 2 separately packed battery drawers on one pallet.



3.4 Weight

NetPro 19" model : **2000** **3000**
 Weight (kg) : 14 25
 Weight with battery drawers : 29 52
 Shipping weight (kg) : 33 60

Battery module CF34B (Vdc/Ah) : 72/7
 Weight (kg) : 20
 Shipping weight (kg) : 22

Battery module CF34B (Vdc/Ah) : 72/14
 Weight (kg) : 35
 Shipping weight (kg) : 37

Battery module CF35B (Vdc/Ah) : 108/7
 Weight (kg) : 32
 Shipping weight (kg) : 34

Battery module CF35B (Vdc/Ah) : 108/14
 Weight (kg) : 54.5
 Shipping weight (kg) : 56.5

4 - Electrical specifications

4.1 Ratings

NetPro 19" model	:	2000	3000
Voltage Amperes (VA)	:	2000	3000
with computer type load	:		
Watts (W) with resistive load	:	1200	1800
Input thermal circuit breaker (A)	:	10	14
Input fuse (A)	:	12.5	n.a.

4.2 Input converter

AC input voltage	:	220 - 240 V	
AC input voltage range	:		
at 100% load	:	187 - 264 V	
at 60% load	:	160 - 264 V	
at 30% load	:	125 - 264 V	
Minimum start-up AC voltage	:	187 V (at any load)	
Maximum start-up AC voltage	:	255 V (at any load)	
Input current (A)	:	6.6	10.0
Input current waveform	:	sinusoidal	
Input power factor	:	1	
Input frequency range	:	50 or 60 Hz \pm 10%	

4.3 Output converter

AC output voltage	:	220/230/240 V (selectable)	
AC output voltage tolerance	:	\pm 1% (static and dynamic)	
Output frequency	:	50 or 60 Hz \pm 0.15% unless synchronized to the mains	
Output waveform	:	sine wave	
Harmonic distortion	:	< 2% (typical 1.5%) with linear load	
Power factor	:	0.6	
Crest factor (peak to RMS current)	:	up to 6:1	
Capacity appliance outlets	:	max. 10 A per outlet	

4.4 Bypass

AC input voltage range	:	187 - 264 V	
Frequency tracking rate	:	max. 2 or 10 Hz/sec. (selectable, factory setting 10 Hz/sec)	
Frequency tracking rate	:	2 Hz/sec	10 Hz/sec
Frequency tracking range	:	nominal \pm 2%	nominal \pm 10%
Phase difference	:	< 7°	< 10°
Transfer time	:	< 1 msec.	

4.5 General design criteria

Safety	:	EN 50091-1-1; EN 60950; IEC 950
Electromagnetic compatibility	:	EN 50091-2; EN 50081-1 + EN 50082-1; IEC 801-5: 6kV

Note: The NetPro 19" UPS is intended for use in normal domestic and office situations (see Safety: EN 50091-1-1)

5 - Performance characteristics

NetPro 19" model : **2000** **3000**

5.1 Efficiency (battery fully charged)

Efficiency (%) on mains

- 20% load	: 80	73
- 50% load	: 87	84
- 100% load	: 90	90

Efficiency (%) on battery (at nominal battery voltage)

- 20% load	: 75	71
- 50% load	: 85	82
- 100% load	: 87	88

Max. heat output (W/h)

100% load on mains	: 134	200
--------------------	-------	-----

5.2 No-load power consumption (battery fully charged)

On mains

No load power consumption (W)

normal operation / sleep mode	: 50/18	90/32
-------------------------------	---------	-------

On battery

No-load power consumption (W)	: 55	105
-------------------------------	------	-----

5.3 Environment

Ambient temperature : -10 to +40°C

Audible noise at 1 meter : < 45dB(A), load and temperature dependent

Max. relative humidity : 95% (non-condensing)

5.4 Runtimes (ratings given for 25°C)

NetPro 19" model : **2000** **3000**

VA / Watts runtime in minutes

At typical UPS load (75%)	14	14
---------------------------	----	----

100 / 60	186	247
200 / 120	113	159
400 / 240	61	91
600 / 360	41	63
1000 / 600	23	37
1500 / 900	14	24
2000 / 1200	9	16
2500 / 1500	-	12
3000 / 1800	-	9

Units connected to battery modules will have longer runtimes. See section 8.5.

5.5 Alarm conditions

The LCD screen on the front panel displays status messages and alarm messages. Three kinds of messages can be recognized.

- status indications indicate the UPS operating mode
- high priority alarms indicate situations in which the connected load is at risk as a proper output voltage of the UPS is no longer guaranteed; immediate action should be taken. The screen message is accompanied by a red LED 'alarm' and a 1x per second sounding buzzer, resettable.
- low priority alarms indicate abnormal operating situations; the screen message is accompanied by a 1x per 8 secs. sounding buzzer, resettable. In case of 'weak mains' a yellow LED on the front panel illuminates and the buzzer will remain silent.

Overview of all messages:

Message text	Kind of message		
	Status indication	High priority alarm	Low priority alarm
On line	•		
On battery	•		•
On bypass	•	•	
Error	•		
Battery low		•	
Fan error (NetPro 19" 3k)		•	
Overload		•	
Output error		•	
High temperature		•	
Input converter error		•	
Charger error (NetPro 19" 2k)		•	
Charger error (NetPro 19" 3k)			•
Temperature			•
Replace battery			•
Bypass error			•
Progr.outlet off (NetPro 19" 3k)			•
Input error			•
Weak mains			•

Note: By using ComConnect, additional conditions can be monitored and signals include written screen messages (see section 6, Communications Port).

5.6 Overload capability

Overload protection : Fully protected against overload and short-circuit.

Overload behaviour:

on-line operation, bypass enabled : 110% during 5 minutes, 150% during 2 seconds
on-line operation, bypass disabled : 110% during 110 seconds
battery operation, NetPro 19" 2000 : 110% during 5 minutes, >135% during 110 seconds
battery operation, NetPro 19" 3000 : >110% during 110 seconds
bypass operation : depends on rating of thermal circuit breaker; typical
105% of TCB value: no trip
135% of TCB value: trip within 1 hour
200% of TCB value: for 2 - 30 secs
300% of TCB value: for 0.8 - 4 secs.

5.7 Standard features

Wide AC input voltage window

Minimises need for battery operation

High voltage protection

Above the maximum input voltage (264Vac), the NetPro 19" will protect itself and the load by disconnecting the mains and switching to battery operation. Reducing the mains voltage will recover the normal situation. If the mains voltage rises above 312Vac the NetPro 19" shuts down immediately and must be restarted manually.

Power factor one input

The AC input current drawn by the UPS is less than that supplied to the load. Contrary to UPSs and computers without this feature, no disturbances which may cause problems to other electrical equipment are fed back to the mains. This feature will become mandatory within a few years.

Bypass operation enable/disable

In case of an unstable bypass voltage and/or frequency you may not wish the load to be transferred to the bypass. Front selectable.

No UPS inrush current

When switching on, the UPS causes no inrush current. Inrush currents result in voltage dips on the mains which can disturb other equipment or even blow the fuse of the distribution board.

No load inrush current (softstart of the connected load)

Also when switching on, the bypass is disabled for a short while, avoiding high inrush currents of the load through the bypass, which also can cause tripping the distribution fuse.

Battery start (cold start)

Allows you to switch on the unit while the mains input is absent.

Start autonomy time

The unit can be programmed to start again after a mains failure only when sufficient runtime is available to be sure to have battery back-up for a next mains failure.

Adjustable frequency tracking rate, 2 or 10 Hz/sec

Can be optimized for generator use.

Locking of settings

To avoid accidentally changing of UPS functions, the setting of these functions can be locked for extra safety.

Programmable outlet (NetPro 19" 3000 only)

One of the three appliance outlets is programmable. When the UPS is started the outlet is always switched ON, but it can be switched off either manually or automatically. When automatic switch off is selected, the system asks for the 'Off autonomy time': the remaining runtime (in minutes) at which, during a mains failure, the programmable outlet is automatically switched off until the mains returns. This way less critical equipment (e.g. screens, printer) can be switched off automatically in order to lengthen the remaining runtime.

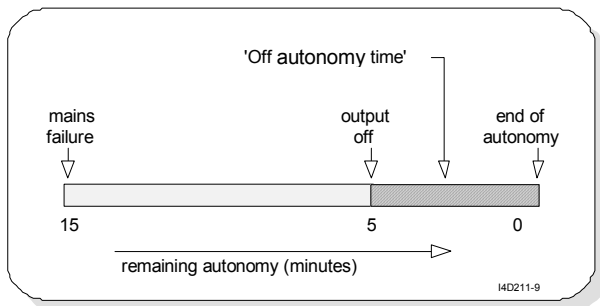


Fig. 6 Off autonomy time

Figure 6 shows an example. The total predicted runtime is 15 minutes, and the 'off autonomy time' has been set on 5 minutes: the outlet switches off 5 minutes before the predicted end of the runtime.

As the load decreases when the outlet switches off, the actual remaining runtime at the 'outlet off' moment will be longer than the programmed 5-minute period.

If option 'AUTO' is selected the outlet can still be switched off manually using the front panel keys.

Superior battery management for maximum battery life and reliability:

- **Automatic (quick) battery test**
The NetPro 19" UPS conducts automatic battery tests to ensure that the batteries and the wiring are healthy and able to support power failures. The tests are executed 5 hours after starting up or return of mains, and every 30 days. The tests can also be initiated through UPS monitoring software.
- **Deep battery calibration test**
The actual battery capacity can be tested by the UPS monitoring software, ensuring accurate runtime prediction. During a deep battery test the batteries will be discharged until 'battery low' alarm level. Please refer to the manual of the appropriate monitoring software package.
- **Temperature compensated battery charging**
This feature reduces the battery charge voltage with increasing temperature. As a result poor charging of the batteries under low temperature conditions and overcharging of the batteries under high temperature conditions are prevented.
- **Load dependent battery-end voltage**
The allowable final battery voltage depends on the discharge current: the higher the current, the lower the 'end-of-discharge' battery voltage. This gives maximum capacity without overdischarging. Overdischarging results in failure to recover normal capacity and in shortened battery life.
- **Automatic boost charge**
Reduces the recharge time to 1.5 hours for approx. 90% capacity without overcharging the batteries.
- **Charger off at end of charge**
Only charging when necessary, increases battery life time.
- **No-load shutdown**
Whenever load <5% of maximum load and no mains power is present the UPS will switch off automatically. Load sensing during battery mode prevents unnecessary discharging of the batteries. The function is default not activated (front selectable).

6 - Communications port: ComConnect

6.1 Principles of operation

All models in the NetPro 19" series are equipped with a communications port, the ComConnect, located at the back of the unit. The ComConnect is a plug-in interface port (9-pin, Sub-D, male) which enables advanced communication between the UPS and the computer (interface kit required).

Communication can be done in serial format (ComProt) or through contact closure interfacing. The electrical interface of ComProt is part of the ComConnect standard. It supports ComConnect 5: Plug and Play ready, and standard with open collector contacts. Relay contacts are available as an option (see section 8).

The microprocessor controlled and galvanically isolated ComConnect sends information concerning power levels and UPS condition to the computer or network interface. In the event that batteries are near exhaustion, it sends commands for unattended controlled shutdown of the computer system. The ComConnect can also receive UPS shutdown signals from the computer or network interface.

When signals are sent to the computer, a written message can appear on the screen to inform the user. Monitored conditions include:

- mains voltage availability
- discharge level of batteries
- temperature of unit (during output converter operation)
- interactive control- and diagnostic information for stand-alone and network systems

ComConnect is operative as soon as the mains power cord is plugged into a live wall outlet, even if the UPS is switched off.

Interface kits (cables and/or software) are available for operating systems supporting JAVA and most commonly used network operating systems, including Novell, UNIX, VMS, Windows, IBM AS/400, IBM OS/2, LINUX.

For specific information on **GE Digital Energy's** connectivity products please contact your local dealer or Internet: www.gedigitalenergy.com.

The ComConnect cable should be shielded.

6.2 Pin functions

Pin #	Function
1	RS232 input
2	RS232 output
3	General alarm ¹⁾
4	PnP: Plug and Play
5	Common
6	Bypass active
7	Battery low
8	UPS connected
9	Mains failure

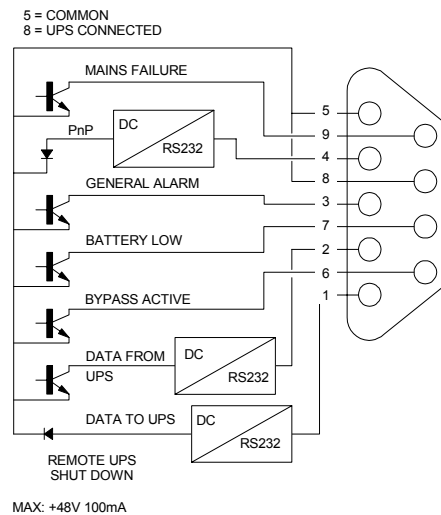


Fig. 7 RS232 / contact interface

¹⁾ Active if the output voltage of the UPS is no longer guaranteed due to other circumstances than already indicated by pin 6-7-9:

- Output converter overload
- Overtemperature (pre-alarm)
- Battery failure
- Bypass out of limits
- High charger voltage
- Fan failure
- Inverter shutdown (due to inverter failure or battery failure)

The ComConnect port conforms to EN 50091 and is independent of the UPS function.

7 - Batteries (ratings given for 25°C)

NetPro 19" model	:	2000	3000
Nominal voltage (V)	:	72	108
Number of 7 Ah batteries	:	6	9
Type	:	sealed and maintenance free	
Service life	:	up to 6 years (depending on operating conditions)	
Runtime	:	see section 5.4, Runtimes	
Battery recharge current	:	1.5 A	
Battery recharge time	:	1.5 hours for 90% capacity (std. battery)	
Automatic (quick) battery test	:	5 hrs after return of mains, 5 hrs after manual switch on, and 30 days from last battery test	

Long term storage: see chapter 9.

8 - Options

8.1 SNMP interface card

An SNMP interface card can be placed in the CardConnect slot in the rear panel of the UPS, and allows the data interface to be connected directly to an Ethernet network. When this option is installed the ComProt communication link is no longer available to the user.

8.2 Relay interface card

An interface card supporting ComConnect-05 can be placed in the CardConnect slot in the rear panel of the UPS. Potential free change-over contacts are available for the following alarms: mains failure, general alarm, battery low, bypass active. The contacts are wired to a terminal strip and to a 9-pole sub-D connector.

8.3 Alarm boxes

The **contact UPS relay box**, linked to the ComConnect port, translates the ComConnect signals to five independent change-over contacts, with a maximum switching capacity of 230V/5A each.

A wall mounted plastic **contact UPS alarm box** is available for remote audible and visual alarm indication.

8.4 Connectivity products

A **splitter box** translates information from the ComConnect to several computers.

Interface kits (cables and/or software) are available for operating systems supporting JAVA and most commonly used network operating systems, including Novell, UNIX, VMS, Windows, IBM AS/400, IBM OS/2, LINUX. Please contact your dealer for specific information.

8.5 Longer runtimes (NetPro 19" 2000/3000)

By adding extra battery modules the runtime of the NetPro 19" can be extended.

Battery packs for the NetPro 19" 2000 are available in 72V/14Ah, and for the NetPro 19" 3000 in 108V/7Ah.

	Battery extension voltage/capacity V/Ah	total capacity Ah	typical runtime 100% / 50% load minutes	enclosure	weight (kg)
for NetPro 19" 2000					
1 x	1 x 72/14	21	39 / 82	CF34B	42.5
2 x	2 x 72/14	35	70 / 141	CF34B	85
for NetPro 19" 3000					
1 x	1 x 108/7	14	24 / 53	CF35B	35
2 x	2 x 108/7	21	40 / 84	CF35B	70
3 x	3 x 108/7	28	55 / 114	CF35B	105

8.6 DC extension cables

DC extension cables are available for custom-built long runtime solutions. Please contact your dealer for specific information.

9 - Transport / storage

No liability can be accepted for any transport damage when the equipment is shipped in non-original packaging. During transport the battery drawer(s) must either be removed or fixed with two screws (each) at the rear side of the UPS.

Store the UPS in a dry location with the batteries in a fully charged state. Storage temperature must be within -20 +45 °C. If the unit is stored for a period exceeding 3 months, optimal battery lifetime is obtained if the storage temperature does not exceed 25°C.

If the unit is stored for an extended period of time, the batteries must be recharged periodically. Be sure that the battery drawers are connected to the UPS. Subsequently connect the unit to a wall outlet and recharge the batteries for 24 hours:

- if the storage temperature is within -20 and +30°C: every 3 months,
- if the storage temperature is within -20 and +45°C: every month.

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